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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DONALD CHRISTOPHER, MARSHALL ROBINSON,
HELEN ROUTH, CLAUDIO SIMON, AHMED MORSY,
KEITH JOHNSON, and PATRICK RENE PESQUE

Appeal 2009-005176
Application 10/694,666
Technology Center 3700

Decided: December 14, 2009

Before: LINDA E. HORNER, JOHN C. KERINS, and
MICHAEL W. O'NEILL, *Administrative Patent Judges*.

HORNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Donald Christopher et al. (Appellants) seek our review under 35 U.S.C. § 134 of the Examiner's decision rejecting claims 9-17, 19, and 23. Claims 1-8, 18, 20-22, and 24-33 are cancelled. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

SUMMARY OF DECISION

We AFFIRM.

THE INVENTION

Appellants' claimed invention relates to ultrasonic diagnostic imaging systems in which Doppler display parameters are automatically optimized. Spec. 1:7-10. Claim 9, reproduced below, is representative of the subject matter on appeal.

> 9. A method for optimizing the display of Doppler ultrasound information comprising:
>
> receiving Doppler signal information, including at least some Doppler signal information which is not used to produce a displayed Doppler image;
>
> processing Doppler signal information for display of a Doppler image in a display area; and
>
> analyzing Doppler signal information which is not used to produce a displayed Doppler image to optimize at least one of the display parameters of the PRF, the color baseline, the color range polarity, or the range of color pixel values for display of the processed Doppler signal information in the display area.

THE EVIDENCE

The Examiner relies upon the following evidence:

Seo	US 4,501,279	Feb. 26, 1985
Torp	US 6,099,471	Aug. 8, 2000

THE REJECTIONS

Appellants seek review of the following rejections by the Examiner:

1. Rejection of claims 9-15, 17, 19, and 23 under 35 U.S.C. § 102(b) as anticipated by Torp.

2. Rejection of claim 16 under 35 U.S.C. § 103(a) as unpatentable over Torp and Seo.

ISSUE

Appellants argue claims 9-15, 17, 19, and 23 as a group. App. Br. 5-7. We select claim 9 as the representative claim, and claims 10-15, 17, 19, and 23 stand or fall with claim 9. 37 C.F.R. § 41.37(c)(1)(vii) (2009). Appellants assert that Torp does not anticipate claim 9 because Torp discloses how to calculate and display strain velocity information in real time, but does not disclose use of non-displayed ("hidden") Doppler image information to optimize Doppler image displays. App. Br. 5-6 (referencing the Declaration of Ivan Salgo). Appellants rely on these same arguments for the patentability of claim 16 over Torp and Seo, adding that Seo does not cure the deficiencies of Torp. App. Br. 7.

The issue before us is:

Have Appellants shown that the Examiner erred in finding that Torp discloses use of Doppler signal information which is not displayed ("hidden") to optimize Doppler image displays?

FINDINGS OF FACT

We find that the following enumerated facts are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422,

1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

1. Appellants' Specification does not provide a lexicographic definition of the phrase "Doppler signal information which is not used to produce a displayed Doppler image," or any of the terms within that phrase, as used in claim 9. Spec. *passim*.
2. Appellants' Specification describes a velocity display optimizer 20 that analyzes spectral Doppler data and uses the results of the analysis to adjust parameters of a spectral Doppler display. Spec. 4:22-25; Fig. 1.
3. For example, the image processing techniques of the present invention may be used to correct the Doppler spectral waveform 30 from appearing predominately in one portion of the display so that Doppler spectral waveform 30 is centered on the zero velocity baseline 32. Spec. 5:23-25; Spec. 6:9-22; Fig. 2. One method of adjustment (optimization) uses a process to calculate traces 34 and 36, the upper and lower boundaries of the waveform. Spec. 7:17-26; Fig. 3. Velocity display optimizer 20 obtains the peak positive and negative excursions of the waveform traces 34 and 36, and uses that information to center the Doppler spectral waveform 30 on the zero velocity baseline 32. Spec. 7:17-26 (see also general description of centering process at Spec. 5:23 to 7:16).
4. Appellants' Specification describes that users may elect to display or not display waveform traces 34 and 36. Spec. 7:26-31.
5. Torp discloses an invention related to diagnostic ultrasound systems used to measure and image anatomical structures and their

movement. Torp, col. 1, ll. 16-18. More specifically, Torp discloses a signal processing method and apparatus for calculating and displaying of strain velocities, in localized parts of the image, in real time. Torp, col. 1, ll. 18-21; col. 3, ll. 36-38.

6. Strain velocity is a measure of the rate of deformation of an object, in this case, the material being examined. Torp, col. 1, ll. 25-26; col. 2, ll. 52-53. For example, the strain associated with muscle tissue corresponds to a ratio of the muscle tissue's initial length and the change in length over a prescribed time interval. Torp, col. 1, ll. 26-29. The rate of change of strain (e.g. strain rate, strain velocity, etc) may be visually presented as a two-dimensional, colorized image with color variations to represent different strain velocities. Torp, col. 1, ll. 29-33.
7. Torp discloses the apparatus includes a transducer 5 that emits a pulsed ultrasonic beam 6 into the body, where the beam 6 is backscattered from structures in the body to produce echoes detected by a receiver 2. Torp, col. 4, ll. 57-63; Fig. 1. The receiver 2 passes the echoes to complex demodulation stage 12. Torp, col. 4, ll. 62-67; Fig. 1. Complex demodulation stage 12 demodulates the echo signals into data pairs representative of the echo signals, and passes the signals to strain calculation stage 14. Torp, col. 4, l. 65 to col. 5, l. 2; Fig. 1. Strain calculation stage 14 uses this information to carry out strain velocity calculations. Torp, col. 5, ll. 1-4; Fig. 1.
8. Calculation stage 14 can include a reliability index module 28 to correct for chaotic tissue movement by calculating an index

indicating the reliability of the strain velocity calculation. Torp, col. 7, ll. 6-7, 39-43; Fig. 2.

9. Torp discloses an embodiment where a receiver 2 records at least two continuous echo signals that are passed to complex demodulator 12 and converted to signal packets 24 and 25, which are passed to strain calculation stage 14. Torp, col. 6, ll. 51-55; Fig. 2. Strain calculation stage 14 uses the signal packets 24 and 25 to calculate powers P1 and P2[1] and the strain correlation function S(r). Torp, col. 6, ll. 57-65.
10. The reliability index module 28 uses powers P1 and P2, and the strain correlation function (S(r)) to calculate the reliability index. Torp, col. 6, ll. 11-12, 65; col. 7, ll. 44-47 (equation 11).
11. The reliability index module 28 uses the reliability index to improve the displayed image in two ways. First, it compares the calculated reliability index to a threshold value to remove noisy strain velocity values from the display. Torp, col. 7, ll. 9, 44-49. Second, it modulates (modifies) the color scale used to display strain velocity by decreasing the saturation of the displayed color when the reliability index is low. Torp, col. 7, ll. 49-53.
12. Torp does not disclose that the reliability index is displayed. Torp, *passim*.

[1] Powers P1 and P2 are synonymous to P(r) and P(r+dr), respectively, each pair representing the Doppler signal power at two points. Torp, col. 5, ll. 13-22; col. 6, ll. 51-64 (note that corresponding complex correlation functions R1 and R2 are represented as R(r) and R(r+dr) in equation 8).

PRINCIPLES OF LAW

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

ANALYSIS

Rejection of claims 9-15, 17, 19, and 23 under 35 U.S.C. § 102(b) as anticipated by Torp

Independent claim 9 recites a method that includes receiving "at least some Doppler signal information which is not used to produce a displayed Doppler image," and analyzing that information to optimize at least one of the display parameters. Appellants' Specification does not provide a lexicographic definition of the phrase "Doppler signal information which is not used to produce a displayed Doppler image" (Fact 1), but provides an example of such information. Appellants' Specification describes a velocity display optimizer 20 that analyzes spectral Doppler data and uses the results of the analysis to adjust display parameters (Fact 2). In order to center the image of a Doppler waveform on the zero velocity line, the velocity display optimizer 20 obtains the peak positive and negative excursions of the

waveform from traces 34 and 36 (the calculated upper and lower boundaries of the waveform) (Fact 3). When not displayed (Fact 4), waveform traces 34 and 36 are then Doppler signal information which is not used to produce a displayed Doppler image, but which is used to adjust (optimize) a parameter (position relative to the zero velocity baseline) of a displayed Doppler image (Doppler spectral waveform 30). Based on this example from Appellants' Specification, a person of ordinary skill in the art would understand that "Doppler signal information which is not used to produce a displayed Doppler image" ("hidden" Doppler signal information) includes information that is calculated (processed) from received Doppler signals, such as traces 34 and 36.

Appellants' argument supports this claim construction. Appellants assert that a person of ordinary skill in the art would recognize that raw (unprocessed) Doppler signals are not displayed until processed by using the Doppler shift to calculate the velocity differential of the object being imaged, and then displaying an image of that velocity differential, such as by color mapping. App. Br. 6-7. Thus, "Doppler signal information which is not used to produce a displayed Doppler image" includes information obtained by processing raw (unprocessed) Doppler signals, in which the obtained information is not used to produce a displayed Doppler image, but is used to adjust a parameter of a displayed Doppler image. With this construction in mind, we analyze the rejection.

We agree with the Examiner that Torp discloses a reliability index that is calculated from raw Doppler signals and that is not used to produce a displayed Doppler image (Facts 5-10, 12). See Ans. 3. Further, Torp's reliability index, similarly to Appellants' traces 34 and 36, is used to

optimize at least one of the display parameters (modulating the color scale) of the processed Doppler signal information in the display area (Fact 11).

Appellants submitted a Declaration of Ivan Salgo to show the differences between Torp's method and the method of claim 9. The Declaration states:

> Torp et al. produce strain velocity by obtaining tissue Doppler signals, then taking a derivative (gradient) of tissue Doppler velocity to produce his strain velocity images from Doppler measurements as shown in Fig. 1 of their patent.
>
> In Torp et al. all of the Doppler echoes are apparently used for the tissue Doppler signals used for strain imaging. There is no intimation of acquiring Doppler echo signals that are not used for imaging, and certainly no intimation of using any undisplayed Doppler signals to optimize the parameters of PRF, color baseline, color range polarity or the range of color pixel values of a Doppler image.

Decl. 1-2. The Declaration fails to persuade us of error in the Examiner's rejection because it fails to discuss Torp's reliability index, and it does not comport with the language of the claim. As we explained *supra*, the claim does not require "Doppler echo signals that are not used for imaging." Rather, the claim language recites "Doppler signal *information* which is not used to produce a displayed Doppler image." (Emphasis added). We construed this language to include information obtained by processing raw (unprocessed) Doppler signals, in which the obtained information is not used to produce a displayed Doppler image, but is used to adjust a parameter of a displayed Doppler image. The claim language does not preclude the use of the raw Doppler signals, from which the Doppler signal information was obtained, for producing a displayed Doppler image. As such, Appellants

have failed to demonstrate error by the Examiner in the rejection of claim 9. Claims 10-15, 17, 19, and 23 fall with claim 9.

Rejection of claim 16 under 35 U.S.C. § 103(a) as unpatentable over Torp and Seo

Claim 16 depends from independent claim 9.

Appellants argue that Seo does not disclose "Doppler signal information which is not used to produce a displayed Doppler image" as recited in claim 16. App. Br. 7. This argument fails to demonstrate error by the Examiner in the rejection of claim 16. The rejection of claim 16 relies on Torp for disclosure of this limitation, and we concluded in the analysis of claim 9, *supra*, that Appellants failed to demonstrate the Examiner erred in this finding. See Ans. 4.

CONCLUSION

Appellants have failed to show the Examiner erred in finding that Torp discloses use of Doppler signal information which is not displayed ("hidden") to optimize Doppler image displays.

DECISION

We AFFIRM the decision of the Examiner to reject claims 9-17, 19, and 23.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

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